N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

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Research Design

Contributors
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Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

Causality
A \[\rightarrow\] B
Pressure \[\rightarrow\] Ulcer

Multicausality
Years smoking \[\rightarrow\] Heart disease
High fat diet \[\rightarrow\] Heart disease
Limited exercise \[\rightarrow\] Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
Elements of a Strong Research Design (3)

- **Controlling the treatment**
  - Choose a treatment based on research and practice
  - Develop a protocol for implementation
  - Document the implemented treatment
  - Use a check-list to determine the extent of completeness to which the treatment was implemented
  - Evaluate the treatment during the study
Elements of a Strong Research Design (4)

• **Controlling measurement**
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- Controlling extraneous variables
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

Is there a treatment?

No

Is the primary purpose examination of relationships?

No

Descriptive Design

Will the sample be studied as a single group?

No

No

Correlational Design

Yes

Yes

Quasi-Experimental Study

Is the treatment tightly controlled by the researcher?

No

Yes

Will a randomly assigned control group be used?

No

Yes

Is the original sample randomly selected?

No

Yes

Experimental Study
Selecting a Descriptive Design

Exchanging sequences across time?
  - Yes
    - Following same subjects across time?
      - Yes
        - Single unit of study
      - No
        - Studying events partitioned across time?
          - Yes
            - Case study
          - No
            - Trend Analysis
  - No
    - One Group?
      - Yes
        - Descriptive Design
      - No
        - Comparative Descriptive Design

Research Design

Cross-sectional design
Cross-sectional design with treatment partitioning
Longitudinal design with treatment partitioning
A Typical Descriptive Design

Clarity of Interest → Measurement → Description → Interpretation

- Variable 1
- Description of Variable 1
- Interpretation of Meaning
- Development of Hypotheses

- Variable 2
- Description of Variable 2

- Variable 3
- Description of Variable 3

- Variable 4
- Description of Variable 4
A Comparative Descriptive Design

Group I {variables measured} → Describe → Comparison of Groups on Selected Variables → Interpretation of Meaning → Development of Hypotheses

Group II {variables measured} → Describe → Comparison of Groups on Selected Variables → Interpretation of Meaning → Development of Hypotheses
Selecting the Type of Correlational Design

- **Describe relationships between/among variables?**
  - Descriptive correlational design

- **Predict relationships between/among variables?**
  - Predictive correlational design

- **Test theoretically proposed Relationships?**
  - Model testing design
A Descriptive Correlational Design

Measurement

Research Variable 1

Description of variable

Examination of Relationship

Interpretation of Meaning

Description of variable

Development of Hypotheses

Research Variable 2
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

- Control Group?
  - Yes
    - Repeated Measures?
      - No
        - Strategy for Comparison
          - Yes
            - Suggest Reevaluating design
          - No
            - Compare treatment & control conditions?
        - Yes
          - One group pretest/post-test design
  - No
    - Pretest?
      - Yes
        - Repeated Measures?
          - No
            - Suggest Reevaluating design
          - Yes
            - Compare treatment & control conditions?
        - No
          - One group pretest/post-test design
      - No
        - Comparison with population values?
          - Yes
            - Repeated Measures?
              - No
                - Strategy for Comparison
              - Yes
                - Suggest Reevaluating design
          - No
            - One-group post-test only design
      - No
        - One-group post-test only design
# Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Measurement of dependent variables</th>
<th>Manipulation of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>PRETEST</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td>POST-TEST</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Treatment:</th>
<th>Under control of researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Findings:</td>
<td>Comparison of pretest and post-test scores</td>
</tr>
<tr>
<td></td>
<td>Comparison of experimental and control groups</td>
</tr>
<tr>
<td></td>
<td>Comparison of pretest-post-test differences between samples</td>
</tr>
</tbody>
</table>

| Uncontrolled threats to validity: | Testing Mortality  |
| Instrumentation | Restricted generalizability as control increases  |
## Post-Test-Only Control Group Design

<table>
<thead>
<tr>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Randomly selected experimental group</strong></td>
<td><strong>TREATMENT</strong></td>
</tr>
<tr>
<td><strong>Randomly selected control group</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:** Comparison of experimental and control groups


**Uncontrolled threats to validity:** Instrumentation, Mortality, Limited generalizability as control increases
### Pain Control Management

<table>
<thead>
<tr>
<th></th>
<th>Primary Nursing Care</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Primary Care</td>
</tr>
<tr>
<td>Traditional care</td>
<td>Unit A</td>
</tr>
<tr>
<td>PRN Medication</td>
<td>Unit B</td>
</tr>
<tr>
<td></td>
<td>Unit C</td>
</tr>
<tr>
<td>New approach: “Around the clock” medication</td>
<td>Unit G</td>
</tr>
<tr>
<td></td>
<td>Unit H</td>
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</tbody>
</table>

Research Design
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically

- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design